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THE BOMBAY DOCKS.

DESCRIPTION OF CASTLE DOCK.

THE water area comprises 30 acres 3 roods 17 poles, Imperial measure.

2. The length of the Dock-walls available for shipping accommodation, exclusive of that portion occupied by the Government Graving Docks, from the Breakwater to the south-west corner of the Custom House Basin, is 5,140 lineal feet, *minus* 80 feet for the width of the Dock Gate-entrance.

3. The length of the Dock-wall, from the Breakwater to the south-west corner of the Custom House Basin, in front of the Government Graving Docks, measures on the plan 1,020 lineal feet, which provides berthage space for two Troop-ships or steamers for the use of Government only, exclusive of the space occupied by the entrances into the Old Dock and the Duncan Graving Docks.

4. The length of the Dock-walls available for mercantile ships and steamers is $\frac{5060}{250}$ lineal feet $= 20\frac{60}{250}$ ships, each averaging 250 feet in length, single tier only, and, with a double tier along the Quay-walls, 40 ships, *plus* those ships and steamers which can be fixed to moorings in the centre of the Castle Dock.

5. The width of the Dock Gate will be 80 feet on the square, which will be opened and closed by Hydraulic power.

6. The width of the Quayage available for ships' cargo, from the front of the Quay-wall to the Dock shedding, is 120 feet, and the shedding is 80 feet wide in the outer wall of the Dock shedding; at every 250 feet, large iron sliding-doors will be fixed, for the purpose of receiving pressed Cotton bales from Cargo boats, and for the delivery of ships' cargo into native craft connected with the Coasting trade, and, in addition thereto, that part of the sea-wall between the Dock Gate and the Mody Bay Reclamation which measures 1,550 lineal feet, for a similar purpose.

7. The depth of water on the Dock sill at high-water spring-tides will be 35 feet 6 inches.

8. The depth of water on the Dock sill at low-water spring-tides will be 20 feet.

9. The height of the coping-stones on the Quay-walls will be 4 feet 6 inches above the level of the high-water spring-tides, and 40 feet above the upper surface of the Dock Gate sill.

10. Mody Bay Reclamation (as originally proposed by former Governments) is the best and most convenient site for a General Terminus for the Great Indian Peninsula Railway, for the public, and the interests of Government, which will give an economical and convenient junction with the Dock Tramways without any further outlay on the part of Government.

11. That space of ground marked **A** on the plan, at the south bastion of the Castle, and the proposed line of Quay-wall, in addition to ample Quayage space for shipping and landing cargo, will provide a convenient site for fire-proof Bonded Warehouses, and the Hydraulic Accumulator, for opening and closing the Dock Gates, the wrought-iron Swing Bridge across the Dock entrance, and the permanent Hydraulic Cranes.

12. That filthy inlet marked **B** on the plan, on the north side of the

present Custom House Bunder, will be filled up with the Dock excavations to form part of the Custom House new Quay, which will be connected with Marine Street by a communication road between the Custom House and the Arsenal.

13. The present Custom House Pier, as delineated on the plan, will be removed altogether.

14. The segmental water space marked **C**, between the existing Custom House Wharf-wall and the proposed new Quay-wall, will be filled up to provide additional Quayage area to the Custom House Quay.

15. The two spaces colored purple—one on the west side of the entrance to the Duncan Graving Dock marked **D**, and the other on the east side of the Old Graving Dock marked **E** on the plan—will be filled up level with the Government Dockyard, for the use of Troop-ships and steamers loading and unloading stores and munitions of war for the use of the Government only.

16. The Dock wharf shedding will be erected in such a manner as to suit the interests, convenience, and requirements of owners of the different Lines of Steamers trading with the Port of Bombay for depositing ships' cargo not intended for the Bonded Warehouse, but for transhipment or forwarding by Railway.

17. Full-pressed pales of Cotton, conveyed by either the Great Indian Peninsula Railway, or the Bombay, Baroda and Central India Railway, can, immediately on their arrival at Boree Bunder General Terminus, be shunted along the Tramways traversing the line of Docks, and deposited in sheds, or shipped on board any of the vessels lying in Dock, as circumstances may deem expedient.

18. At the north end of the Castle Dock marked **F** on the plan, Landing Stairs will be erected for the accommodation of the public, when going to or coming from the Shipping in the Harbour.

19. The site of the Castle Dock is more central and more convenient for the Customs Department, the mercantile community, and the public, than any other submitted for the consideration and decision of the Government.

20. The estimated cost of construction of the Castle Dock works—*viz.*, Cofferdams, Pumping-water, Excavations, Embankments, Masonry, Dock Gate, Swing Bridge, Travelling Crane, and Hydraulic Cranes and Shedding—is Rs. 48,65,969.

21. The time required for the construction of the above works is a period of three years from the date of their commencement.

22. The cost of construction of the fireproof Bonded Warehouses, with their Hydraulic Hoists, have not been estimated in the absence of working drawings.

DESCRIPTION OF WELLINGTON DOCK.

The water area comprises 23 acres 1 rood $26\frac{55}{100}$ poles.

2. The length of the Quay-walls, exclusive of the entrance and communication gate channels available for berthage space, is $\frac{4869}{250}$ lineal feet = $17\frac{110}{250}$ ships.

3. The berthage on the west Quay, opposite the Government Ship-building Slips, will not interfere with the launching of ships into the Wellington Dock.

4. From the Wellington west Quay on the north side of the Government Ship-building Slips in the Dockyard, a communication road will be formed to a point nearly opposite St. Andrew's Church, Apollo Street.

5. The width of the Quays of the Wellington Dock for receiving ships' cargo is 120 feet; and the width of the Dock shedding, for depositing cargo for shipment or for delivery, is 80 feet.

6. A communication between the Castle Dock and the Wellington Dock, 80 feet wide, has been provided with Gate and wrought-iron Hydraulic Swing Bridge.

7. On the east or Harbour side of the Dock shedding, opposite the centre of each ship's berth, large iron sliding-doors will be fixed in the brick-wall to allow for landing and shipping cargo (that is to say, pressed Cotton bales), which may be sent by Cargo boats from the different Cotton Presses for shipment, and for the transhipment of merchandize to Coasting vessels.

8. A site for warehouses, for the convenience of the mercantile community, has been delineated on the plan on the Wellington Reclamation, on the north side of the Wellington Pier road, on the top of which suites of offices may be erected.

9. The depth of the Dock Gate sills, the height of the Quay-walls, the height of high-water spring-tides, and the depth of water at low-water spring-tides, above the level of the Dock Gate sills, are the same as those stipulated for the Castle Dock.

10. The estimated cost of construction of the Wellington Dock works—*viz.*, Cofferdams, Pumping-water, Excavations, Embankments, Quay-walls, Sea-walls, Gate-walls, Wrought-iron Hydraulic Swing Bridges, Hydraulic Quay-Cranes, and Dock Shedding—is Rs. 42,27,082 (Forty-two lakhs twenty-seven thousand and eighty-two).

11. The time required for the execution and completion of these works, supposing that they will be carried out at the same time that the Castle Dock is being built, is four years from the commencement thereof.

DESCRIPTION OF APOLLO DOCK.

The water area comprises 17 acres 3 roods 25 poles.

2. The length of the Dock-walls (exclusive of the portion occupied by the Gate-entrance and communication channel between the Wellington and Apollo Docks) available for berthage, is $\frac{3675}{250}$ lineal feet = 15 ships.

3. The Government Coal Depôt, at the south-west angle of the Apollo Dock, will, for the interests of Government, be materially improved, inasmuch as Coal ships will be moored alongside of the west Quay-wall, and there discharged without the aid of Cargo boats; and War-steamers can be coaled in like manner without extra expense.

4. The Apollo Basin will be filled up, thereby increasing the area of the Bunder, to meet the requirements of the Bombay, Baroda and Central India Railway and the Shipping of the Port.

5. The Wellington Basin will advantageously form an excellent Bonded Wine and Spirit Vault with warehouses above, and supply a want urgently required by the Government and the mercantile community of Bombay.

6. The east and south Dock shedding, when erected, will, in a measure, protect the Shipping in the Apollo Dock from the force of the South-East Monsoon.

7. The Arthur Basin will remain, after the construction of the Apollo Dock, in its present state for the landing of native produce.

8. The Bombay, Baroda and Central India Railway will have a convenient

connection with the line of Docks, which, in a commercial sense, may be considered a great boon to that undertaking.

9. The depth of the Dock Gate sills, the height of the Quay-walls, the height of high-water spring-tides, and the depth of water at the level of the Dock Gate sills at low-water spring-tides, are the same as those of the Wellington and Castle Docks.

10. The estimated cost of the works which comprise the construction of the Apollo Dock—*viz.*, Cofferdams, Pumping-water, Excavations, Embankments Quay-walls, Sea-walls, Gate-walls, Dock Gates, Wrought-iron Hydraulic Swing Bridges, Travelling Steam Crane, Fixed Hydraulic Quay-Cranes, and Dock Shedding—is Rs. 35,85,313 (Thirty-five lakhs eighty-five thousand three hundred and thirteen).

11. The time required for the execution and completion of these works, should they be proceeded with at the same time that the Castle and Wellington Docks are, is five years from the date of their commencement.

Castle Dock	Rs. 48,65,969
Wellington Dock	,, 42,27,082
Apollo ,, ...	,, 35,85,313
Total	Rs. 126,78,364

S. A. JOHNSON.

Bombay, 21st May 1874.

SUGGESTIONS.

The construction of the Castle Dock will materially increase the Quayage area surrounding the Custom House, and the execution of the works will not prevent the Customs Department from carrying on its daily operations; because the area between the Castle Quay-wall and Hornby's Battery, marked **A**, and the inlet on the north side of the present Custom House Pier, marked **B** on the plan, will be filled up level with the height of the proposed Quay-walls, before the enclosing Cofferdam is completed, to lay dry the areas for the foundations of the Sea-walls, the Quay-walls, and the water area of the Castle Dock. But during the execution of the works, advantage should be taken of the Hydraulic Graving Dock at Hog Island, that is to say, if circumstances should require such, for the purpose of careening and examining ships' bottoms during the time that the Castle Dock works are in progress, and until their final completion.

2. Should Government consider it necessary, an opportunity will be offered for deepening either the Old or the Duncan Graving Docks, to receive large Troop-ships and War-steamers for examination and repair. With this available facility, there will therefore be no necessity to put the Imperial Government to the unnecessary expense of building additional Graving Docks, which have been proposed to be done on the Elphinstone Property.

3. The Government ought to bear in mind the circumstances that the location of the Castle Dock alongside the Custom House, and the Dockyard Graving Docks, there are TWO COMMODIOUS BERTHS FOR TROOP-SHIPS whereby greater facilities are offered, in a warlike point of view, than the Basins which have been proposed for transformation on the Elphinstone Reclamation.

4. The Dock shedding has been delineated on the plan alongside of the sea-walls with an object in view, that is to say :—When the Docks are completed, and ready to receive ships, the different Lines of Steamers trading with the

Port of Bombay will require shedding accommodation for storing Indian products previous to shipment, also for depositing ships' cargo immediately on its arrival ; consequently, it may be inferred that the Agents of each line of Steamers will hire Quayage space and shed area in accordance with their requirements, whereby a fixed annual revenue will accrue for the exclusive use of portions of the Dock shedding, in addition to the Quayage and Cranage dues.

5. The water required to work the Accumulators for opening and closing the Dock Gates, the Swing Bridges, and work Quay-Cranes, together with the warehouse hoists, can be pumped up out of the Docks, or supplied direct from the Vehar water-pipes, thereby employing a primative power, and dispensing with manual labor. A considerable saving in the daily working expenses will thus be effected.

6. The Shipping in the Docks will be supplied with Vehar water from a sub-main laid along the Quays, which will have at every 250 feet, or length of a ship's berth, supply-valves fixed for attaching a hose to convey the water on board. By such appliances, a saving of Rs. 19,552 per annum to the Port Trustees, in water-supply to the Shipping, will be effected.

7. Instead of filling up the Wellington Basin, it should be converted into Liquor Stores for the Commissariat Department, and Bonded Wine and Spirit Vaults for the mercantile community, with warehouses above the level of the Basin walls for the convenience of the Customs Department.

8. Directly opposite "the proposed Bonded Wine and Spirit Vaults" on the Wellington Reclamation, a site has been suggested for warehouses, with offices on the top floor for those interested in, and connected with, the Shipping of the Port.

On the south side of the proposed communication road from the west Quay-wall of the Wellington Dock to a point near St. Andrew's Church, Apollo Street, there will be building sites available for the erection of warehouses and offices. From their proximity to the line of Docks, Government will have the option of selling, or giving them on lease, on advantageous terms.

10. On the completion of the Apollo Dock works, a considerable saving of public funds will be effected in the matter of the Government Coal Depôt on the Apollo Reclamation, inasmuch as that Coal ships can discharge their respective cargoes, and Government Transports and War-steamers ship their complement of Coal, without the aid of Cargo boats.

11. The Bombay, Baroda and Central India Railway will have a direct communication with the west Quay of the Apollo Dock, in a similar manner to that for the Great Indian Peninsula Railway at Mody Bay Terminus, with its inexpensive, direct, and convenient junction with the Dock Tramways, which could not be obtained if the Elphinstone deep-water Tidal Basins were to be substituted for the Castle, Wellington, and Apollo Docks. The latter sites are close to the Custom House, the usual anchorage ground, the Government offices, and the centre of business, which, when built, will accommodate the whole of the present and future Shipping frequenting the Port of Bombay, for fifty years hence, and, comparatively speaking, at much less cost than the proposed Elphinstone deep-water Tidal Basins.

12. The interests of the State, and the convenience of the public, will be better served, without any further expenditure of Imperial funds, by having the General Terminus of the Great Indian Peninsula Railway in Mody Bay than at any other site. A convenient junction can be made with the Tramways traversing the Quays of the proposed line of Docks, by simply putting in a pair of points and crossings to connect them.

13. Mr. Ormiston, in a memorandum for the information of the Committee appointed under G. R. 226 C. W. 772 of 1870, dated 20th April, states—"These

Basins are intended to have masonry Wharf-walls about 43 feet high, and to be deepened to 20 feet at low water of springs, which would give 28 feet at half-tide.

"The smaller Basin is to be 1,200 feet long, and 320 feet wide, which gives an area of 9 acres, with a Quay frontage, including that of the Harbour, of 2,760 lineal feet.

"The larger Basin is to be 1,400 feet long and 1,000 feet wide, with a jetty from the north side of 600 feet by 240 feet, giving a water area of 29 acres, and a Quay frontage, including that along the Harbour, of 7,542 lineal feet.

"It is proposed to make a Graving Dock at the north-east corner of the Elphinstone Basin, sufficiently large for Troop-ships.

"The cost of completing the Dock works will be about one and a quarter millions sterling, and they will take five years to execute; but the smaller Basin, with a serviceable channel, may be ready in about three years, if funds be provided."

It will be observed that Mr. Ormiston only gives the aggregate cost of the proposed works on the Elphinstone Reclamation, *viz.*, Rs. 1,25,00,000, but what he neglected to give I will endeavour to glean from Mr. Kittredge's memorandum on Wet Docks without Gates!—

1st.—The Elphinstone Basin	= Rs.	58,64,530
2nd.—The Musjid Basin	= „	30,00,000
3rd.—The Graving Docks, and Contingencies	= „	36,35,470
	Rs.	1,25,00,000

Plus the cost of Engineering Staff chargeable to Capital for five years during the execution of the works = Rs. 57,665½ × 5 ..... = Rs. 2,88,327½

General Tremenheere says in his Dissent from the Report of the Committee:—"Government will perceive at once how very restricted the available accommodation for the trade will be, when the whole frontage from A to A, half a mile in length, is occupied by works in progress. It is necessary to refer to the large existing traffic, as stated in the Committee's Report, to bear in mind how rapidly it is developing, and that the proposed works may take five years, and may take much longer, to complete, to appreciate the gravity of this objection.

"*Sixth.*—Connected with the last objection is the almost certain loss of revenue which will accrue from the inability to accommodate the rapidly-increasing trade, and that this loss will extend over the period of five years, and may extend over a considerably longer period."

Then

Rs. 1,61,534 × 5 ..... = 8,07,670

Rs. 1,35,95,997½

(This represents 25 per cent. only of the estimated income from the Elphinstone Basins as set forth in the Budget of the Chairman of the Bombay Port Trust for the year ending 31st March 1875.)

General Tremenheere, in his Dissent from the Committee's Report on the Elphinstone and Musjid Basins, states that three Graving Docks are proposed to be built there, which may be the cause of the great difference between the estimated cost of the Elphinstone and Musjid Basins shewn by Mr. Kittredge's memo., and Mr. Ormiston's aggregate estimate of Rs. 1,25,00,000, the difference being ..... Rs. 36,35,470

(for three Graving Docks and unforeseen contingencies.)

14. The estimated probable annual cost of dredging the entrance Deep-water Channel to the Elphinstone Basin, ¾ mile long, 700 feet wide, and one foot deep, based on Mr. Ormiston's rates for cleaning the Musjid, Nicol, and Carnac Basins, will be thus—

$$3960 \times 700 \times 1 = 2772000 \text{ cubic feet.}$$

and

$$\frac{2772000}{100} = 27720 \text{ Brass of Silt.}$$

and

$$27720 \times 4{\cdot}25 = ₹\ 1,17,810.$$

15. Mr. Kittredge states in a foot-note to his memorandum on Wet Docks, dated 7th November 1873 :—

"I have deducted from Mr. Ormiston's estimate Rs. 3,00,000 for sheds and Rs. 50,000 for shears, both of which should pay for themselves, and not be a charge on the Dock (Deep-water Tidal Basin), Rs. 3,50,000 *plus* 10 per cent. *plus* 7 per cent. equal Rs. 4,11,950 ; Rs. 58,64,530 *minus* Rs. 4,11,950 equal Rs. 54,52,280—say 55 lakhs. It must be remembered, too, that, of the 55 lakhs. 10 will be spent in Cranes, &c., which will not be wanted till the Dock is completed. When we shall pay interest, only 45 lakhs, therefore, will be asked of the Government of India as a loan without interest."

The above extract plainly shows that the estimated cost of transforming the Elphinstone Basin into a deep-water tidal, one to accommodate 22 ships, is Rs. 58,64,530, "and that Rs. 14,11,950 is deducted from that sum, as it is averred that the Rs. 14,11,950 will not be wanted till the Dock is completed ! ! !"

Then

Rs. 58,64,530 — Rs. 14,11,950	=Rs. 44,52,580
It may, however, be asked, what is the estimated cost of the transformation of the Elphinstone Basin with a water area of 29 acres to accommodate 22 ships (without a Gate, without Wharf Shedding, without Shears, without fixed Wharf Cranes, without Steam Travelling Wharf Cranes, without contingencies, and without Engineering commission fees), with a ¾-mile dredged entrance-channel 700 feet wide and 20 feet below the level of low-water spring-tides? *Plus* the cost of the component parts to complete the deep-water Tidal Basins for the reception of ships	14,11,950
It, therefore, will appear obvious, when Mr. Kittredge's figures are freed from obscurity and the Basin completed to receive ships, that it will cost the Government	= 58,64,530
Plus the cost of Engineering Staff chargeable to capital estimated by the Chairman of the Port Trust in Budget for 1874 at Rs. 57,665½ × 5	= 2,88,327½
Plus the loss of revenue that will accrue during the period that the works are in progress, amounting per annum to Rs. 1,61,534 × 5	= 8,07,670
Total Rs.	69,60,527½

Per ship's berth Rs. 3,16,387$\frac{1}{11}$.

16. The Musjid Tidal Basin is alleged to contain 9 acres of water area and give accommodation for 9 ships, estimated to cost Rs. $\frac{30,00,000}{9}$ = Rs. 3,33,333 per ship's berth.

17. Compare Mr. Ormiston's estimate with the Castle Dock in rear of the Fort Custom House, containing a water area of 30 acres 3 roods 17⅓ poles, and will accommodate 22 ships (single tier), estimated to cost—inclusive of Cofferdams, Excavations, Filling between walls, Concrete, Masonry in Sea and Quay-walls, Dockgate, Hydraulic Swing Bridge, Hydraulic fixed Quay-Cranes, Steam Travelling Quay-Cranes, Accumulator, Dock Shedding, contingencies, and Engineering commission fees—complete for traffic, Rs. $\frac{48,65,959}{22}$ = Rs. 2,21,180$\frac{9}{22}$ per ship's berth.

The Wellington Dock contains a water area of 23 acres 1 rood 26½ poles, and accommodates 17 ships (single tier), estimated to cost, including all works pertaining thereto, Rs. $\frac{42,27,082}{17}$ = Rs. 2,48,651 per ship's berth.

And the Apollo Dock contains a water area of 17 acres 3 roods 25 poles, and will accommodate 15 ships (single tier), estimated to cost, including all works pertaining thereto, Rs. $\frac{35,85,313}{15}$ = Rs. 2,39,020$\frac{13}{15}$ per ship's berth.

18. Compare Mr. Ormiston's Estimate for the Elphinstone and Musjid Tidal Basins and the three Graving Docks (mentioned in General Tremenheere's

Dissent against the Committee's Report), with the shipping accommodation and estimate for the completion of the Castle, Wellington, and Apollo Docks.—

Description.	Acres.	Estimated Cost. Rs.	No. of Ships accommodated.
Elphinstone Tidal Basin	29	58,64,530	22
Musjid Tidal Basin	9	30,00,000	9
	38		
Three Graving Docks		36,35,470	.....
Cost of Engineering Staff chargeable to Capital Account		2,88,327½	.....
Plus five years' loss of revenue during the construction of the works, estimated in Port Trust Budget for 1874 at $\frac{\text{Rs. } 6,46,136}{4}$ = Rs. 1,61,534 × 5 ..... =		8,07,670	.....
		Rs. 1,35,95,997½	31

And

	Acres.	R.	P.	Estimated Cost. Rs.	No. of Ships accommodated.
Castle Dock	30	3	17⅓	48,65,969	22
Wellington Dock	23	1	26½	42,27,082	17
Apollo Dock	17	3	25	35,85,313	15
Total...	72	0	28⅚	1,26,78,364	54
Difference in favor of the Castle, Wellington, and Apollo Docks	34	0	28⅚	9,17,633½	23

Then the average rate per ship's berth in the Castle, Wellington, and Apollo Docks ..... = $\frac{\text{Rs. } 1,26,78,364}{54}$ = Rs. 2,34,784

And the average rate per ship's berth in the Elphinstone and Musjid Tidal Basins ..... = $\frac{\text{Rs. } 1,35,95,997\frac{1}{2}}{31}$ = Rs. 4,38,580$\frac{17}{31}$

19. Compare the cost and accommodation of the Elphinstone Tidal Basin, without the three Graving Docks (mentioned by General Tremenheere in his Dissent), with that of the Castle Dock.—

Description.	Acres.	R.	P.	Estimated Cost. Rs.	No. of Ships accommodated.
Elphinstone Basin	29	0	0	58,64,530	22
Castle Dock	30	3	17⅓	48,65,969	22

Direct Saving to Government	Rs. 9,98,561
Plus Engineering Charges	,, 2,88,327½
Plus cost of Graving Docks not required	,, 36,35,470
Plus loss of five years' revenue during construction of works, estimated at $\frac{\text{Rs. } 6,46,136}{4}$ = Rs. 1,61,534 × 5 =	,, 8,07,670
	Rs. 57,30,028½

20. Compare the relative financial and commercial advantages of the Elphinstone *Tidal Basins* with the Castle, Wellington, and Apollo *Docks*.—

Mr. Ormiston's Estimate.

If 31 ships' berths with three Graving Docks cost the Government Rs. 1,35,95,997½, what will 54 ships' berths cost at the same ratio?—

Then

$\frac{\text{Rs. } 1,35,95,997\frac{1}{2}}{31}$ = Rs. 4,38,580$\frac{17}{31}$ × 54 ..... =	Rs. 2,36,83,320
Minus the cost of the Castle, Wellington, and Apollo Docks	,, 1,26,78,364
Difference...	Rs. 1,10,04,956

(With 23 extra ships' berths.)

Mr. Kittredge's Estimate.

If 22 ships' berths without Graving Docks cost the Government Rs. 69,60,527½, what will 54 ships' berths cost at the same ratio?—

Then

$$\frac{\text{Rs. } 69,60,527\frac{1}{2}}{22} = \text{Rs. } 3,16,387\frac{1}{44} \times 54 = \text{Rs. } 1,70,84,898$$

Minus the cost of the Castle, Wellington, and Apollo Docks	,,	1,26,78,364
Difference...	Rs.	44,06,534

(With 32 extra ships' berths.)

21. Compare the value of sites, *vide* Mr. Ormiston's memorandum to the Committee in the matter of the Elphinstone Reclamation at the date of transfer to the Government. £1,800,000 sterling—

Description.	Square Yards.	Acres.
Railway Reclamation	338,800	70
Malet Bunder	43,560	9
Land Estate	450,000	92·975
Graving Dock Estate	253,132	52·3
Dock Estate (Elphinstone and Musjid Tidal Basins only)...	183,920	38
Areas of Quays and Wharfs	242,000	50
Total.....	1,511,412	312·275

Then

£1,800,000 × 10 = Rs. 1,80,00,000

And

$$\frac{\text{Rs. } 1,80,00,000}{1,511,412} = \text{Rs. } 11\text{-}14\text{-}6 \text{ per square yard mean average value.}$$

Then

	Square Yards.
Dock Estate (Tidal Basins)	183,920
Graving Dock Estate	253,132
Malet Bunder	43,560
Area of Wharfage	242,000
Total.....	722,612

And

722,612 × Rs. 11-14-6 = Rs. 86,03,599-2-0

	Square Yards.
It is thereby shown that the mean average computed price per superficial yard of ground and water comprising the Elphinstone Reclamation cost Government Rs. 11-14-6. This rate, however, cannot be considered the approximate cost of the Land Estate	= 450,000
And the Railway portion	= 338,000
Square Yards.....	788,000

Because that rate per square yard is nearly two hundred per cent. more than the cost of reclaiming such land ought to be, therefore the cost of the Dock Estate, the Graving Dock Estate, Malet Bunder, and Basin Wharfs (as these proposed works are termed) may reasonably be inferred to be $= \frac{\text{Rs. } 1,80,00,000 \times 3}{4} = \frac{\text{Rs. } 1,35,00,000}{722,612} =$ Rs. 18-10-11 per square yard, inclusive of area of water and wharfage, to which add the estimated cost of transformation of the Elphinstone and Musjid Basins into Tidal ones, with three New Graving Docks ..... = 1,25,00,000

		Rs.
Plus five years' loss of revenue from Basins	=	8,07,670
Plus five years' cost of Engineering Staff	=	2,88,327½
Plus difference of cost between Tidal Basins and Docks at the rear of the Custom House	=	9,17,633½
Plus the cost of sites Government paid for the Dock Estate, Graving Dock Estate, Malet Bunder, and Basin Wharfage on the date of transfer	=	1,35,00,000
		2,80,13,631
Minus the cost of the Castle, Wellington, and Apollo Docks		1,26,78,364
Difference being a direct saving to Government of		Rs. 1,53,35,267

(It is proved, and it may be admitted, that the cost to Government for 31 ships' berths $= \frac{\text{Rs. } 2,80,13,631}{31} =$ Rs. 9,03,665$\frac{16}{31}$ per berth.)

22. Compare the area and cost of the sites on the Elphinstone Reclamation with those of the Castle, Wellington, and Apollo Docks, in the rear of the Fort Custom House.—

		Square Yards.
The area of the Elphinstone Dock Estate, the Graving Dock Estate, the Mulet Bunder, and Basin Wharfage	=	722,612
The area of the Castle, Wellington, and Apollo Docks, inclusive of the Quayage beyond the existing Wharf-walls	=	644,692⅔
Difference, square yards...		77,919⅓

	Rs.
The cost of the sites of the Elphinstone Tidal Basins and Wharfs for 31 ships' berths at Rs. 18-10-11 per superficial yard	1,35,00,000
The cost of the sites for the Castle, Wellington, and Apollo Docks for 54 ships' berths	0,00,00,000
Rs.	1,35,00,000
Plus Mr. Ormiston's estimate for 31 ships' berths	1,25,00,000
Plus cost of Engineering Staff charged to Capital	2,88,327⅓
Plus five years' loss of revenue to Government from the Elphinstone and Masjid Basins during the progress of the works =	8,07,670
Plus the difference of cost between the Castle, Wellington, and Apollo Docks, and the Elphinstone Tidal Basins =	9,17,633⅓
Plus the deficiency of ships' berths on the Elphinstone Reclamation Property = Rs. 9,03,665$\frac{11}{31}$ × 23 lips =	2,07,84,295
	Rs. 4,87,97,926
Minus the cost of construction of the Castle, Wellington, and Apollo Docks for 54 ships' berths	1,26,78,364
Total Rs.	3,61,19,562

Being a direct saving to Government of three hundred and sixty-one lakhs nineteen thousand five hundred and sixty-two rupees, with the same accommodation for the Port of Bombay. Although the Wellington Pier Extension is delineated on the plan, and so urgently required for shipping and landing mails and passengers, its cost of erection has not been estimated for the following reasons, *viz.*—

1*st.*—This portion of the Harbour improvements will be more economically executed after the Wellington Dock has been completed.

2*nd.*—The funds required for its erection will, therefore, not be wanted for a period of four years from the date that the Castle Dock is commenced, that is to say, supposing that the Wellington Dock is commenced at the same time.

3*rd.*—Masonry pier lines have been delineated on the plan as the most permanent work, and eventually cheapest. However, a pier with a wrought-iron superstructure divided into Bays, with cast-iron cylinder piers, filled with cement concrete, could be substituted for the continuous masonry one.

The Elphinstone Reclamation was, by the promoters thereof, originally intended to provide greater facilities in accommodation for the native Coasting trade of Western India; and although the Bombay Government have purchased that work from the original shareholders, all things considered, greater benefit will accrue to the Public Treasury, and the convenience of the native mercantile community, by allowing the Elphinstone Bunder Wharfs to remain as they are, than to attempt to expend further monies on the ill-considered proposition of transforming them into deep-water Tidal Basins (with a ¾-mile entrance-channel, which is estimated to cost Rs. 1,17,810 per annum to keep it clear from silt) and a certain loss instead of a profit—or, in other words, to make bad worse, if it were possible to make it so.

Bombay, 21st May 1874.

S. A. JOHNSON.

APPENDIX.

Vide papers relative to a Project for Wet and Dry Docks in the Harbour Bombay, being Selections from the Records of the Bombay Government o. XXXIII. New Series.

Resolution of Government, dated 17th March 1855.

Para. 2nd.—The considerations which, on a *primâ facie* view of this question, em most to affect it, are the availability or otherwise of any place adapted, in an ngineering point of view, for their construction. The convenience of merchants, e public, and Government, with respect to the proximity of such place to the ustom House Harbour, may be effected, and the extent to which they may affect e Railway approach to Bombay.

Para. 3rd.—As the several interests to be taken into consideration by the ommittee are numerous, and as Government is desirous that they should, as ar possible, be represented, the Committee must necessarily be a large one, Goverent resolve that the Chamber of Commerce be invited to select two of their body lling to associate themselves to the following gentlemen, who shall be requested form a Committee for the above purposes :—

Major-General Waddington, Chief Engineer, P. W. D.
E. Heycock, Esq., Merchant.
Commander Daniell, Master Attendant and Inspector of the Port.
R. Strong, Esq., Merchant.
R. Spooner, Esq., Acting Commissioner of Customs.
J. J. Berkley, Esq., C. E., Chief Engineer G. I. P. Railway Company.
Major Estridge, Executive Engineer, Belgaum.

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inal Resolution of the Committee appointed by Government to consider and report upon certain Projects and Plans for Wet and Dry Docks, with a view to determine the locality which it will be most proper for Government to offer to any Company who may undertake to construct the projected Docks.

Para. 2nd.—That the site at Mody Bay is not sufficiently large for a general heme of Dock accommodation, although it might suffice for Import Docks only. rom the estimates before the Committee, it appears also that the cost of construcon at Mody Bay would be much more considerable, in proportion to the accommodan offered, than at any of the other sites ; the site is in all other respects most igible.

Para. 3rd.—That the site between Apollo Bunder and Arthur Bunder ppears to the Committee, all points considered, preferable to any other. It has e paramount advantage of ample space ; is easy of access by sea ; possesses com-

mercial conveniences little inferior to those of Mody Bay site ; and, with reference to the accommodation to be obtained, may probably be built on at a lower cost.

(Signed) C. WADDINGTON, Major-General, Royal Engineers, President.
" E. HEYCOCK.
" CHARLES WILLIAM MONTRIOU, Commander I.N., and Master Attendant.
" R. STRONG.
" RICHARD SPOONER.
" JOHN PARSONS.
" JAMES GRAHAM.

Memorandum **D** by C. W. MONTRIOU, Commander I.N., and Master Attendant, &c.—Dated Master Attendant's Office, 15th October 1855.

Minute by the Hon'ble A. MALET, Esq.—Dated 24th October 1855.

Minute by the Hon'ble J. G. LUMSDEN, Esq.—Dated 5th November 1855.

Further minute by the Hon'ble A. MALET, Esq.—Dated 27th December 1855.

Further minute by the Hon'ble J. G. LUMSDEN, Esq.—Dated 13th January 1856.

Letter No. 2 of 1856, from Major-General C. WADDINGTON, C.B., President of the Dock Committee,
To W. HART, Esq., Secretary to Government.—
Dated Bombay, Office of Chief Engineer, 30th April 1856.

Letter No. 1273 of 1856, Public Works Department, from W. HART, Esq., Secretary to Government,
To The President of the Dock Committee.—
Dated Bombay Castle, 23rd May 1856.

Resolution of Government, dated 19th June 1856.

Extract from the Proceedings of the Directors of the Bombay Dock and Land Reclamation Company, Limited—Offices, 16, Apollo Street, 28th November 1860.

Para. 3.—The Directors would, in particular, call the attention of the shareholders to the proposed extension of the Apollo Pier to the length of 1,459 feet by 158 feet, with a head, 600 feet by 200 feet, in the direction of the tidal current, for landing mails and passengers, and to the extension of the Arthur Bunder to the length of 888 feet, with a head 500 × 415 + 200 feet for a Coaling station for the use of the Navy.

(Signed) W. SEBRIGHT GREEN, Chairman.
" ROBERT FAIRBAIRN, *Ex-officio* Director.
" PURSHOTUMDASS MOHANDASS, Director.
" ABRAHAM SHEPPERD, Director.

Government Resolution No. 226 C.W., April 20th, 1870.

Advantages of Mody Bay for a site for Docks, by General Tremenheere, President of the Dock Committee, dated 7th June 1870.

No. 2.

THE COMPARATIVE ESTIMATES

OF

"THE BOMBAY DOCKS"

WITH

ELPHINSTONE TIDAL BASIN

AND

MOODY BAY TIDAL DOCK.

110172

DEMONSTRATION OF ADVANTAGES OF THE BOMBAY DOCKS, IN COMPARISON WITH THE ELPHINSTONE AND MOODY BAY TIDAL PROJECTS PROPOSED BY MR. ORMISTON, THE PORT TRUSTEES, AND THE BOMBAY PUBLIC WORKS DEPARTMENT.

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1. The direct distance between the centre of the Fort Custom House Basin Wharf-wall, and the Elphinstone Basin, is about two miles; and the centre of Government Moody Bay Project is 4,550 lineal feet.

2. The direct distance between the centre of Moody Bay Project and Messrs. W. Nicol and Co.'s Offices, Elphinstone Circle, is 3,900 lineal feet.

3. The direct distance between the face line of the Fort Custom House Wharf-wall, and Messrs. W. Nicol and Co.'s Offices, Elphinstone Circle, is 630 lineal feet.

4. The direct distance between the Castle Dock and Messrs. W. Nicol and Co.'s Offices, Elphinstone Circle, is 3,270 lineal feet nearer than the centre of Moody Bay Project.

5. The Bombay Docks are in front of the Fort Custom House and Government Bonded Warehouses, and alongside the Dockyard.

6. There are no Bonded or other Warehouses on Moody Bay property, and none are proposed to be built by Mr. Ormiston.

7. The estimate for the Moody Bay Dock provides Wharf-shedding 600′ × 60′.

8. The estimate for the Castle Dock (only) provides Wharf-shedding 1300′ × 80′ over all.

9. The stowage area of the (Bombay) Castle Dock is 104,000 superficial feet of shedding.

10. The stowage area of the Moody Bay Dock shedding is 36,000 superficial feet.

11. The stowage area of the Castle Dock shedding is 68,000 superficial feet more than the stowage area of the Moody Bay Dock shedding.

12. The Castle Dock (only) provides 13 tidal berths for ships more than the Moody Dock.

13. The Bombay Docks provide Dock berthage space for 32 ships more than the Moody Bay Project.

14. The height of the Bombay Dock Wharves will be one foot higher than those of the Elphinstone and Moody Bay Projects.

15. The width of the Bombay Docks' Gate-entrances will be 20 feet wider than those proposed by Mr. Ormiston for the Moody Dock and Elphinstone Basin.

16. The level of the upper surface of the Gate-sills to the Bombay Docks will be 7′·30″ feet lower than those proposed for the entrances to the Elphinstone and Moody Bay Projects.

17. The bottom level of the Bombay Docks will be 8′·50″ feet lower than the proposed bottom of the Elphinstone and Moody Bay Projects.

18. The depth of water in the Bombay Docks at low-water springs and all other tides, will be 8′·50″ feet more than at the Elphinstone and Moody Bay Projects.

19. Greater shipping facilities will, therefore, unquestionably be obtained by the formation of the Bombay Docks on the site indicated between the Castle and Arthur Bunder, whereby the charges on shipping and unshipping Indian products, merchandise, mails, and passengers will be materially lessened.

20. The stipulated time for completing the Moody Bay Project is seven years more than that for building the Bombay Docks.

21. The stipulated time for completing the Moody Bay Dock (only) is one year more than that for building the Bombay Docks.

22. The stipulated time for completing the Moody Bay Dock (only) is three years more than that for building the Castle Dock.

23. The stipulated time for completing the Elphinstone Basin according to Mr. Ormiston's estimate, is one year more than that for building the Bombay Docks.

24. The stipulated time for completing the Elphinstone Basin according to Mr. Ormiston's estimate, is three years more than that for building the Castle Dock.

25. The estimated cost of the Castle Dock is Rs. 59,53,905-11-2 less than the estimated cost of the Moody Bay Dock.

26. The estimated cost of the Bombay Docks is Rs. 4,52,555-13-9 less than the cost of the Moody Bay Dock Stilling Basin and Channel.

27. The estimated cost of the Bombay Docks is Rs. 76,51,081-1-4 less than the cost of completing Moody Bunder, Moody Basin, Boree Bunder, Moody Channel, Moody Dock, Stilling Basin, Moody Dock Channel, reclamation of land estate, sidings, balance of cost of plant, and deficit of volumes of Moody Dock excavations, according to Mr. Ormiston's reduced levels.

28. The estimated cost of completing the Elphinstone Basin with a Southern Entrance and a Southern Channel, two miles distant from the Fort Custom House, as per Colonel Dickens, R.A., Secretary to the Government of India Public Works Department, with the figures of his revised estimate dated 24th August 1874, and No. 398-CM corrected (for works only), is Rs. 34,69,152-12-3 more than the cost of building the Castle Dock with a similar number of Dock berths at the front of the Custom House.

29. The estimated cost of the Elphinstone Basin, according to Colonel Dickens' revised estimate of the Bombay Port Trust Commissioners' estimate, dated 4th July 1874, when that gentleman's figures are corrected, and the value

of the sites of the Elphinstone Basin, and the wharves which surround it, are added to the cost of the works and plant, it will cost Rs. 3,82,278-0-11 more than the Bombay Docks with their Hydraulic auxiliaries.

30. Without extra expenditure on the part of Government, the Bombay Dock Wharves provide a direct communication with the G. I. P. Railway at the north end, and the B. B. and C. I. Railway at the south end, of the Docks, thereby forming a connecting link with the Bombay Docks, and the whole of the Railways that now are, and those that may hereafter be, laid down throughout India.

31. With the increased wharfage areas to the Government Dockyard (marked **D** and **E**), the Custom House Wharf (marked **C**), the filling up of the Arsenal Basin (marked **B**), the large area which will be reclaimed in front of the Castle between the Custom House Basin and the Moody Bay Reclamation, as delineated upon the General Plan of the Bombay Docks, will unquestionably be a great saving to the State, and effect an important sanitary improvement for the Port and Harbour of Bombay.

32. Further saving can be effected by the conversion of the Wellington Basin into Bonded and other store Vaults, for supplying the mercantile wants and requirements of the Commissariat Department of Bombay, together with the filling up of the Apollo Basin, whereby the area of the Apollo Bunder will be increased and utilized in forming a convenient junction for the B. B. and C. I. Railway with the Tramways traversing the line of Docks.

33. The foregoing allegations may appear more obvious when it is averred that the bottom of the Bombay Docks will be three feet lower than the middle-ground anchorage in the Harbour.

34. Under these circumstances, it must become apparent to those who are conversant with the laws of transmission of volumes, whether, having a great or small specific gravity, that easy and speedy ingress to, and egress from, Docks, during all states of the tides, with an equivalent depth of water to that of the tidal estuary communicating therewith, is what a Shipping Port requires ; and the site submitted for the location of the Bombay Docks alongside of the Custom House, is the only one on the Harbour foreshore where such advantages can be obtained.

35. The revenue, and interest thereon, which will accrue to Government during the time that the Bombay Docks will be completed, before the Elphinstone Basin or the Moody Bay Dock Project are, should command the serious attention of the Bombay Agents for the Right Hon'ble the Secretary of State for India.

36. In submitting the foregoing statement of facts, when they are placed under impartial investigation, it will then be found *that any further outlay of public money, either on the Elphinstone Reclamation or on the Moody Bay property, for the construction of Docks, will be but to open the way for a continuation of further estimates, increased expenditure, increased charges on the Shipping, Port and Harbour Dues, Rates, and Taxes*; whereas, on the other hand, the building of the Bombay Docks may be made the foundation to reverse this order of things, and decrease these charges, and, in so doing, recover an increased revenue, and enable the Government of India to realize an income from the property, which the Port Trustees have already acknowledged themselves unable to accomplish.

THE ELPHINSTONE AND MOODY BAY PROJECTS.

The depth of water available for Shipping at the Elphinstone Basin and Moody Bay Dock :—

Extreme High Water	Spring	Tides	= 31′ 10″	Ft.	and on Dock Sill	= 29′ 30″	Ft.
,,	,,	,,	= 28 80	,,	,,	= 27 00	,,
,,	,,	Neap	,, = 25 80	,,	,,	= 24 00	,,
Mean	,,	Level	,, = 22 80	,,	,,	= 21 00	,,
Low	,,	Neap	,, = 19 80	,,	,,	= 18 00	,,
,,	,,	Spring	,, = 16 80	,,	,,	= 15 00	,,
Extreme	,,	,,	,, = 14 50	,,	,,	= 12 70	,,

Stilling Basin—

High Water	Spring	Tides	= 31 60	,,
Low	,,	,,	,, = 15 00	,,

Moody Basin—

High Water	Spring	Tides	= 30 60	,,
Low	,,	,,	,, = 14 00	,,

Moody Basin Channel—

High Water	Spring	Tides	= 28 60	,,
Low	,,	,,	,, = 12 00	,,

Vide Mr. Ormiston's Estimate No. 146, *P. S.*, page 5.

Mr. Ormiston states—"The Plan also shows the Elphinstone Docks, and thus gives a view of the whole Foreshore from Mazagon to the Dockyard, laid out to the best of my ability, and so far as I know the nature of the bottom.

(Sd.) T. O."

THE BOMBAY DOCKS.

Compare the depths of water in the Castle, Wellington, and Apollo Docks, with the depths of water that the Elphinstone and Moody Bay Projects will provide for the Shipping of the Port of Bombay :—

1*st.*—The Depth of Water at the Middle-ground Anchorage at High Water Spring Tides	= 36′ 50″	Feet.
2*nd.*—The Depth of Water in the Docks at High Water Spring Tides	= 39 50	,,
3*rd.*—The Depth of Water in the Docks at High Water Neap Tides	= 34 30	,,
4*th.*—The Depth of Water in the Docks at Low Water Neap Tides	= 28 30	,,
5*th.*—The Depth of Water in the Docks at Low Water Spring Tides	= 23 00	,,
6*th.*—The Depth of Water on the Dock-Sills at Low Water Spring Tides	= 20 00	,,
7*th.*—The Depth of Water at Low Water Spring Tides at the site of the selected entrance to the Castle Dock	= 15 00	,,

8*th.*—The level of the upper surface of the mud at the Middle-ground Anchorage is three feet above the level of the bottom of the Bombay Docks.

THE ELPHINSTONE AND MOODY BAY PROJECTS.

Heights above Town Hall Datum.

Height of Bunder Line	=	91′	00″
Extreme H. W. S. T.	=	88	60
H. W. S. T.	=	86	30
H. W. N. T.	=	83	30
M. W. L.	=	80	30
L. W. N. T.	=	77	30
L. W. S. T.	=	74	30
Extreme L. W. S. T.	=	72	00

Moody Basin.

Surface of Mud	=	67	00
Rock in Basin rises to	=	61	00
Rock deepened to	=	58	00
Rock removed to	=	56	00
Approach Channel	=	60	00

Stilling Basin.

Surface of Mud	=	63	00
Rock rises to	=	58	00
Rock dredged to	=	57	00
Rock removed to	=	56	00

Moody Dock.

Surface of Mud	=	65	57
Rock rises to	=	64	00
The Sills to be at	=	59	30
Bottom of Dock	=	57	50
Rock removed	=	56	00
Width of Gate-entrance	=	60	00

N.B.—Ships can only be docked and undocked at *High Water Neap Tides* at the proposed Elphinstone Basin and Moody Bay Dock.

The Elphinstone and Moody Bay Wharf-walls can only be used by small Coasting Vessels, the depth of water alongside of which will not permit foreign or large Ships to lay alongside without grounding.

THE BOMBAY DOCKS.

Compare the Bombay Docks, to be built in five years, with the Moody Bay Project in accordance with Mr. Ormiston's Plan No. 1172 and Estimate No. 146, requiring twelve years to build.—

Heights above the Town Hall Datum.

The height of the Bombay Dock Wharves when completed	=	92′	00″
The level of the top of the Dock Gates	=	90	00
The level of High Water Spring Tides	=	88	50
The level of High Water Neap Tides	=	83	30
The level of Low Water Neap Tides	=	77	30
The level of Low Water Spring Tides	=	72	00
The level of surface of mud outside the site selected for the entrance to the Castle Dock	=	57	00
The level of the upper surface of Castle Dock Gate Sill	=	52	00
The level of the bottom of Dock	=	49	00
The level of the bottom of the foundations of Dock-walls	=	47	00
The width of the Castle Dock Gates on the square	=	80	00

N.B.—The Dock Gates will be opened and closed with Hydraulic power in two minutes.

Ships which anchor at the middle-ground, where the depth at *Low Water* is 20 feet, can enter the Bombay Docks whenever the Commander (or the Dock Master) may wish to do so.

Ships can dock and undock at all states of the tides, during each twenty-four hours, at the Bombay Docks.

THE ELPHINSTONE AND MOODY BAY PROJECTS.

		Berths.
Elphinstone Basin		=22
Moody Bay Dock—		
Dock Walls		=22
Outside Tidal Wharf Walls	=3010	$=12\frac{10}{250}$
	250	
Stilling Basin—		
Inside East Wall ..	= 825 / 250	$=3\frac{75}{250}$
„ West „ ...	= 990 / 250	$=3\frac{240}{250}$
„ South „ ...	= 250 / 250	=1
Outside East „ ...	= 825 / 250	$=3\frac{75}{250}$
„ South „ ...	= 450 / 250	$=1\frac{200}{250}$
		=11
Moody Basin—		
Inside East Wall ...	= 300 / 250	$=1\frac{50}{250}$
„ South „ ...	=1050 / 250	$=4\frac{50}{250}$
„ North „ ...	=1050 / 250	$=4\frac{50}{250}$
Outside South „ ...	= 550 / 250	$=2\frac{50}{250}$
„ North „ say		=1
		=12
Total Berths...		57

Summary.

Moody Bay Dock	= 22 Shallow Berths.
Wharf Walls	= 35 Tidal „
Total...	57 Berths.

THE BOMBAY DOCK BERTHAGE.

		Berths.
Castle Dock—		
Quay Walls.....		$=22\frac{60}{250}$
Wharf Walls .....=2950	250	$=11\frac{200}{250}$
Wellington Dock—		
Quay Walls		$=17\frac{110}{250}$
Wharf Walls .....=1820	250	$=7\frac{70}{250}$
Apollo Dock—		
Quay Walls		=15
Wharf Walls .....=2275	250	$=9\frac{75}{250}$
Total Berths...		81

Summary.

	Berths.
Castle Dock	= 22
Wellington Dock.	= 17
Apollo Dock	= 15
	= 54 Dock Berths.
Castle Wharf	= 11
Wellington Wharf	= 7
Apollo Wharf.....	= 9
	= 27 Tidal „
Total.....	81 Berths.

THE MOODY BAY DOCK BERTHAGE.

The actual berthage of the Moody Bay Dock amended Plan No. 1173, which has been estimated to require six years to complete. Whence—

	Ships.
The length of the East Dock Walls ..... $=\frac{2600}{250}=10\frac{100}{250}$	
The length of the West Dock Walls ..... $=\frac{2500}{250}=10$	
The length of the North end Dock Walls 275 + 250 ... $=\frac{525}{250}=2\frac{25}{250}$	
The South end Dock Wall. No Berthage is available because the West angular corner =160 feet. East Do. 160 feet, and the width between the gates shows about 180 feet.....	*Nil.*
	22
Plus 200 feet outside Wharf Wall, say one Tidal Berth.....	1
Total Ships	23

THE CASTLE DOCK BERTHAGE.

Compare the berthage of the Castle Dock, to be built in three years, alongside of the Custom House and Government Dockyard, with the Moody Bay Dock Berthage. Whence—

	Ships.
The length of the Quay Walls ..... $=\frac{5060}{250}=20\frac{60}{250}$	
And the length of the Dock Wall in front of the Dockyard, exclusive of the width of the entrances to the Old Dock and Duncan Graving Dock..... ..... $=1020=2$	
	2 Transport Ships.
	22
Outside Wharf Walls between the Castle Dock Gate and Moody Bay Reclamation $=\frac{1550}{250}=6\frac{50}{250}$	
Outside Wharf Walls between the Castle Dock Gate, and the junction with the wall of the Dockyard Breakwater .... $=\frac{2200}{250}=8\frac{200}{250}$	
Total Berths	36 Ships.

The Bombay Docks' Shedding Stowage.

Castle Dock Shedding $=\frac{1,300' \times 75' - 50'' \times 20'}{40} = 49,075$ Tons Ships' Cargo.

Wellington Dock do. $=\frac{2,450' \times 75' - 50'' \times 20'}{40} = 92,487\frac{20}{40}$ „ „

Apollo Dock do. $=\frac{1,275' \times 75' - 50'' \times 20'}{40} = 48,131\frac{10}{40}$ „ „

Whence

$$\frac{189,693\frac{30}{40}\text{ Tons}}{1,500} = 126\frac{693}{1500}\text{ ships of 1,500 tons burden each.}$$

Which is equal to three times the number of ships in the Harbour of Bombay at present, and the Shedding opposite a Ship's berth in the Docks = 250 lineal feet.

Then

$$\frac{250 \times 75 - 50 \times 20}{40} = 9,437\frac{30}{40}\text{ tons of cargo steamer measurement,}$$

= 6 Ships' cargoes or three cargoes of the largest steamers = 3,145 tons each.

THE MOODY BAY DOCK PROJECT.

Description of Works estimated.	Original Estimate.	Figures of Original Estimate corrected.	Original Estimate corrected with the volumes of excavations computed from reduced levels.	Difference of Estimates.	Number of Ships accommodated in Docks.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Moody Bunder, Moody Basin, Boree Bunder and Channel, Moody Docks, Stilling Basin and Channel, Reclamation of Land Estate, Sidings, Plant—12 years in building	2,04,76,320 0 0	=2,08,71,844 15 2	=2,19,34,463 11 11	=14,64,143 11 11	= 22
Moody Dock Stilling Basin and Channel—10 years in building	1,28,67,285 0 0	=1,31,19,713 4 9	=1,47,35,938 8 4	=18,68,653 8 4	= 22
Moody Dock without the Harbour Frontage Wall—6 years in building	1,01,47,833 0 0	=1,03,46,813 12 1	=1,12,19,636 11 3	=10,71,803 11 3	= 22
Compare the Moody Dock Project, 12 years in building, with the Bombay Docks, 5 years in building.	2,19,34,463 11 11	*minus* Bombay Docks 1,42,83,382 10 7		=76,51,081 1 4	and 32 extra Ships' berths
Compare the Moody Dock Stilling Basin and Channel, 10 years in building, with the Bombay Docks, 5 years in building.	1,47,35,938 8 4	*minus* Bombay Docks 1,42,83,382 10 7		=4,52,555 13 9	and 32 extra Ships' berths.
Compare the Moody Dock, 6 years in building, with the Castle Dock, 3 years in building.	1,12,19,636 11 3	*minus* Castle Dock 52,65,731 0 1		=59,53,905 11 2	and 3 years' revenue with interest.

NOTE.—Moody Bay Dock will accommodate 22 ships, and the Bombay Docks 54 ships; further demonstration may be considered unnecessary.

"ELPHINSTONE BASIN.

"*Vide* Government of India letter, Public Works Department, No. 398–CM, dated 24th August 1874, para. 2.

"The result of the detailed examination of the estimate by the Port Trust "Dock Committee, has been the submission of an estimate by the Port Trust "Commissioners, dated the 4th July 1874, amounting to Rs. 67,43,397 for the "Elphinstone Dock. This estimate includes an entrance at the south-eastern "corner, instead of the centre of the eastern face, and provides for the closure of

"the existing entrance by an earthen dam. It does not include interest on capital "during construction : converting rupees into pounds sterling at two shillings for the "sake of uniformity : this estimate, adding interest, compares as follows with "Mr. Ormiston's own project for the Elphinstone Basin, dated 15th January 1874 :—

	Estimate of January.	Estimate of July.
"First totals	= £616,224	= £674,340
"Interest at 4 per cent. during six years	= 87,353	= 86,047
	703,577	= 760,387
"*Less* value of Dredging Plant	= 25,890	= 27,769
Total	£678,288	= £732,618
	or 68 Lakhs	= 73½ Lakhs
"Mr. Ormiston would now add a Swing Bridge in both cases, making "up the cost to	70 Lakh	= 75½ Lakhs

"There is a miscalculation in this : the correct figures are £78,656.

"Thus, taking the estimates submitted, the Trustees' scheme of Dock is "more expensive than that of Mr. Ormiston's by £54,000 ; the difference is due to "greater expense in masonry and excavations, and to the Channel requiring more "dredging."

Compare—

The estimated cost of the Elphinstone Basin with a southern entrance and a Southern Channel, agreeably to the plans adopted by the Port Trustees and now before Government, should stand thus per estimate of July 1874—

Works	= Rs.	57,29,310	0	0
Plus cost of Swing Bridge	=	2,00,000	0	0
Plus deduction from Dredging Plant, made by Colonel Dickens, R.A., Secretary P. W. D. to the Government of India	=	2,77,690	0	0
Plus omission from cost of Dredging Plant made by Colonel Dickens, R.A., Secretary P. W. D. to the Government of India	=	1,28,769	0	0
Plus deduction from cost of Dredging Plant made by Mr. Ormiston, and erroneously charged to his rate for Excavations and Dredging	=	1,19,141	0	0
	Rs.	64,54,910	0	0
Contingencies, 10 per cent.	=	6,45,491	0	0
	Rs.	71,00,401	0	0
Establishment, 7 per cent.	=	4,97,028	0	1
	Rs.	75,97,429	0	1
Six years' Interest at 4 per cent. per annum	=	11,37,454	12	3
	Rs.	87,34,883	12	4
Plus value of the sites of the Elphinstone Basin with the surrounding Wharves = 312,102 square yards at the estimated average rate of Rs. 18-10-11 per square yard, paid by Government for the Elphinstone property	=	58,30,776	15	2
Total	Rs.	1,45,65,660	11	6.

Then

Compare the estimated value of the Elphinstone Basin.....	= Rs.	1,45,65,660	11	6
With that alleged in Colonel Dickens' revised estimate of the Port Trust Commissioners, dated July 1874	=	75,50,000	0	0
Difference	= Rs.	70,15,660	11	6

And

Compare the actual cost of the Elphinstone Basin	= Rs.	1,45,65,660	11	6
With the estimated cost of the Bombay Docks	=	1,42,83,382	10	7
Direct saving, with 32 extra ships' berths in Docks	= Rs.	3,82,278	0	11

Compare the cost of the Moody Bay Dock with the volumes of excavation in mud, clay, and rock, computed from Mr. Ormiston's reduced levels exhibited and set forth at page 8 of estimate, dated 10th June, as per plan No. 1172, and specially referred to at para. 9 in his farewell statement published by the Bombay Port Trustees in the *Times of India*, dated 17th August 1874, without the Harbour frontage wall and Stilling Basin (Tidal Basin); with the Dock slewed in at the north end, as per amended plan No. 1173, with the cost of the Castle Dock only—as per estimate, dated 21st May 1874.

CASTLE DOCK.

Cofferdam, Pumping Water, Excavation, Masonry, Hydraulic Cranes, Swing Bridge, Dock Gate, and Wharf Shedding	= Rs.	48,65,969	0	0
Three years' Interest at 4 per cent.	=	3,99,762	0	1
	Rs.	52,65,731	0	1
Plus Mody Bay Dock excess difference ...	=	59,53,905	11	2
Total.....	= Rs.	1,12,19,636	11	3

MOODY BAY DOCK.

Masonry.....	= Rs.	25,41,447	0	0
Excavations	=	10,42,704	4	1
Dredging Channels	=	82,857	0	0
Land Estate	=	23,68,438	0	0
Entrances complete, pp. 54, 55	=	8,65,499	0	0
Metalling	=	1,50,080	0	0
Sidings	=	1,31,700	0	0
Capstans.....	=	9,600	0	0
Cranes and Seats ...	=	1,05,020	0	0
Bollards	=	38,475	0	0
Mooring Buoys.....	=	23,825	0	0
Water.....	=	15,510	0	0
Sheds.....	=	3,06,000	0	0
Extra for 4 Stairs...	=	3,480	0	0
Swing Bridge	=	2,00,000	0	0
Dredging Plant.....	=	4,06,459	0	0
Contingencies, 10 per cent.	=	8,29,109	6	9
Establishment, 7 per cent.	=	6,38,414	4	1
Six years' Interest, 4 per cent.....	=	14,61,018	12	4
Total.....	= Rs.	1,12,19,636	11	3

THE BOMBAY DOCKS.

Estimate, dated 21st May 1871.

Castle Dock .....=	Rs.	48,65,969	0	0
Wellington Dock ...=		42,27,082	0	0
Apollo Dock .....=		35,85,313	0	0
	Rs.	1,26,78,364	0	0
Five years' Interest at 4 per cent.		16,05,018	10	7
	Rs.	1,42,83,382	10	7
Then *Plus* Moody Bay Project excess difference .....=		76,51,081	1	4
Total...	Rs.	2,19,34,463	11	11

The Bombay Docks.

Estimated Cost .....=	Rs.	1,42,83,382	10	7
Then *Plus* the Moody Bay Dock, Stilling Basin, and Channel per para. 3, Mr. Ormiston's Estimate, dated 10th June 1874—difference ...=		4,52,555	13	9
Total...	Rs.	1,47,35,938	8	4

Compare the Moody Bay Project with the Bombay Docks—*vide*

Mr. Ormiston's Estimate, dated 10th June 1874.

Completing Moody Bunder .....=	Rs.	4,68,596	0	0
Moody Basin .....=		1,39,977	0	0
Boree Bunder .....=		18,72,178	0	0
Moody Channel .....=		84,375	0	0
Moody Dock .....=		66,00,964	0	0
Stilling Basin .....=		22,90,527	0	0
Moody Dock Channel=		35,650	0	0
Reclamation of Land Estate.....=		15,86,989	0	0
Sidings.....=		1,31,700	0	0
Balance cost of Plant=		4,06,459	0	0
	Rs.	1,36,17,415	0	0
Plus deficit volumes of Moody Bay Dock excavation .....=		6,93,279	4	1
	Rs.	1,43,10,694	4	1
Contingencies at 10 per cent.....=		14,31,069	6	10
	Rs.	1,57,41,763	10	11
Establishment at 7 per cent. .....=		11,01,923	7	4
	Rs.	1,68,43,687	2	3
Twelve years' Interest at 4 per cent.....=		50,90,776	9	8
Total...	Rs.	2,19,34,463	11	11

Compare Mr. Ormiston's Estimate of the Moody Bay Dock, Stilling Basin, and Channel.

Para. 3— Works .....=	Rs.	89,27,141	0	0
Balance cost of Dredging Plant.....=		4,06,459	0	0
Plus deficit error in volumes of Moody Bay Dock excavations .....=		6,93,279	4	1
	Rs.	1,00,26,879	4	1
Contingencies at 10 per cent.....=		10,02,687	14	9
	Rs.	1,10,29,567	2	10
Establishment at 7 per cent. .....=		7,72,069	11	2
	Rs.	1,18,01,636	14	0
Ten years' Interest at 4 per cent.....=		29,34,301	10	4
Total...	Rs.	1,47,35,938	8	4

DEMONSTRATION OF MOODY BAY DOCK EXCAVATIONS.

The volumes of Moody Bay Dock excavations computed from Mr. Ormiston's reduced levels above the Town Hall Datum (*vide* Report, dated 10th June 1874)—

		Dimensions of area.	
Length of Moody Bay Dock East Wharf-wall	=	2,600	Lineal feet.
,, ,, West ,,	=	2,500	,,
Width ,, Water space	=	500	,,
North-end Triangle ,,	=	130 × 50	,,

Water Area = 142,027⅓ square yards.

Mr. Ormiston's estimate, page 8—

The excavations are to be made by dredging from levels 65′·57″ above the Town Hall Datum, and removed down to 56′·00″ above ditto.

Then

65′·57″ *minus* 56′·00″ = 9′·57″ depth of excavation.

Page 3—

The rock rises to 64′·00″ above datum. And to be removed down to 56′·00″ above ditto ; and 64′·00″—56′·00″ = 8 feet rock excavation.

Whence—

Surface of mud and clay above datum = 65′ 57″
Top of rock above do. = 64′ 00″ = 1′ 57″ mud and clay.

and

Depth of rock excavation = 8′ + 1′·57″ mud and clay = 9′·57″ depth as before, which proves that the actual depth of excavation to be made at Moody Bay Dock is, without a doubt, established.

Then

$$\text{Area of Dock} = \frac{2{,}600 + 2{,}500 \times 500}{2} = 1{,}275{,}000$$

$$\frac{130 \times 50}{2} = 3{,}250$$

1,278,250 superficial feet.

Whence

$$\frac{1{,}278{,}250' \times 9' \ 57''}{100} = 122{,}328\text{—}525 \text{ Brass Mud, Clay, and Rock.}$$

Then

$$\frac{1{,}278{,}250' \times 1' \ 57''}{100} = 20{,}068\text{—}525 \text{ Brass Mud and Clay.}$$

And

$$\frac{127{,}250' \times 8' \ 00''}{100} = 102{,}260 \text{ Brass Rock.}$$

Total... 122,328—525 Brass Mud, Clay, and Rock.

Volumes of excavations from the area of the foundations for the Wharf Walls of Mody Bay Dock.

Whence—

$$\frac{6{,}013' \times 17' \times 9' \ 57''}{100} = 9{,}782\text{—}5497 \text{ Brass Mud, Clay, and Rock.}$$

Then

$$\frac{6{,}013' \times 17' \times 1' \ 57''}{100} = 1{,}604\text{—}8697 \text{ Brass Mud and Clay.}$$

And

$$\frac{6{,}013' \times 17' \times 8' \ 00''}{100} = 8{,}177\text{—}68 \text{ Brass Rock.}$$

Total... 9,782—5497 Brass Mud, Clay, and Rock.

Summary.

Mud and clay from area of Dock.....	= 20,068— 525		
„ „ „ Wharf-walls	= 1,604—8,697		
		=	21,673—3947
And			
Rock from area of Dock	=102,260		
„ „ Wharf-walls	= 8,177—68		
		=	110,437—68
		Total...	132,111-0747 Brass.

Then

21,673—3,947 Brass mud and clay.....	@ Rs. 2-4 per Brass	=	Rs.	48,765	2 2
110,437—68 Brass rock	„ 9 „	=		9,93,939	1 11
		Total Rs...		10,42,704	4 1
Minus Mr. Ormiston's estimate				3,49,425	0 0
Deficit error			Rupees	6,93,279	4 1

"*Mr. Ormiston's estimate of the Moody "Bay Project, dated* 10*th June* 1874.

"Page 4, para. 7.—The first require-"ment is a suitable dredging machine to "form the trenches. This would take "two years to procure. The outside "walls could not be built in less than "three or four years, and the inside "works would take five or six years "more. I, therefore, think the project "would occupy at least twelve years in "its construction.

"Para 8.—The following is an abstract "of the estimate in sterling money at "two shillings to the rupee :—

"Completing Moody Bunder, "making Moody Basin, "Boree Bunder, and Channel "to the same	=	£256,512
"Moody Dock, Stilling Basin "and Channel to the same...	=	892,714
"Reclamation of Land Estate.	=	158,699
"Sidings	=	13,170
"Balance of cost of Dredging "Plant	=	40,646
"Works	=	£1,361,741
"Contingencies, 10 per cent....	=	136,174
		£1,497,915
"Establishment, 7 per cent....	=	104,856
"Total in 12 years.....	=	£1,602,769
"*i.e.*, per annum £133,564.		
"Interest on the above at 4 per "cent.....	=	444,263
	Total	£2,047,032"

Compare Mr. Ormiston's estimate (computed from his own figures corrected) of the cost of completing Moody Bunder, making Moody Basin, Boree Bunder, and Channel to the same, reclamation of land estate, sidings; Moody Dock, Stilling Basin and Channel to the same, and balance of cost of dredging plant.—(*Vide* page 4, No. 146, dated 10th June 1874.)

		Indian Currency.		
Works	= Rs.	1,36,17,410	0	0
Contingencies, 10 per cent.	=	13,61,741	0	0
	Rs.	1,49,79,151	0	0
Establishment, 7 per cent.....	=	10,48,540	9	2
	Rs.	1,60,27,691	9	2
Twelve years' Interest at 4 per cent.	=	48,44,153	6	0
	Total Rs.	2,08,71,844	15	2

Then

	Rs.	2,08,71,844	15	2
Minus Mr. Ormiston's estimate...	=	2,04,70,320	0	0
Difference error deficit	= Rs.	4,01,524	15	2

Compare Mr. Ormiston's estimate of the Moody Bay Project, comprising Moody Bunder, Moody Basin, Boree Bunder, Moody Channel, Moody Dock, Stilling Basin, Moody Dock Channel, sidings, balance of cost of plant, corrected and computed with volumes deficit of Moody Dock excavations, as per Demonstration—(*vide* Report No. 146, dated 10th June 1874).

Para. 8—

The following is an abstract of the estimate in detail :—

		Indian Currency.	
Completing Moody Bunder	Rs.	4,68,596	
,, Moody Basin		1,39,977	
,, Boree Bunder		18,72,178	
,, Moody Channel		84,375	
,, Moody Dock		66,00,964	
,, Stilling Basin		22,90,527	
,, Moody Dock Channel		35,650	
,, Reclamation of land estate		15,86,989	
,, Sidings		1,31,700	
,, Balance of cost of Plant		4,06,459	
	Rs.	1,36,17,415	
Plus error deficit volume of Moody Dock excavations =		6,93,279	258
	Rs.	1,43,10,694	258
Contingencies, 10 per cent. =		14,31,069	4258
	Rs.	1,57,41,763	6838
Establishment, 7 per cent. =		11,01,923	45786
	Rs.	1,68,43,687	14166
Twelve years' Interest at 4 per cent.		50,90,776	60331
Total.....	Rs.	2,19,34,463	74497

Then—

	Rs.	2,19,34,463 11 11
Minus Mr. Ormiston's estimate ..... =		2,04,70,320 0 0
Difference error deficit.....	Rs.	14,64,143 11 11

"*Estimate of Moody Dock Stilling Basin and Channel by Mr. Ormiston, dated 8th August* 1874."

"Para. 3—

"Works	Rs.	89,27,141
"Contingencies, 10 per cent. =		8,92,714
"Establishment, 7 per cent. =		6,87,390
	Rs.	1,05,07,245
"Ten years' Interest at 4 per cent..... =		23,60,040
Total...	Rs.	1,28,67,285

"In the calculation of interest, the work is assumed to take ten years to complete, and the money is assumed to be expended year by year during the period of construction."

Compare Mr. Ormiston's estimate of Moody Bay Dock, Stilling Basin, and Channel, dated 8th August, computed from his own figures (corrected), which have been published by the Bombay Port Trust in the *Times of India*, dated 17th August 1874.

Para. 3—

Cost of Works ...	Rs.	89,27,141	0	0
Contingencies, 10 per cent. ..... =		8,92,714	0	2
	Rs.	98,19,855	0	2
Establishment, 7 per cent..... =		6,87,389	13	8
	Rs.	1,05,07,244	13	10
Ten years' Interest at 4 per cent. ... =		26,12,471	6	11
Total...	Rs.	1,31,19,716	4	9

Then—

	Rs.	1,31,19,716	4	9
Minus Mr. Ormiston's Estimate... =		1,28,67,285	0	0
Difference error deficit ..... =	Rs.	2,52,431	4	9

Compare Mr. Ormiston's estimate of cost of the Moody Bay Dock, Stilling Basin and Channel to the same, dated 8th August, and published by the Bombay Port Trust in the *Times of India* on the 17th August 1874, with corrections, and deficit of volumes of Moody Bay Dock excavations. In the calculation of interest, the work is assumed to take ten years to complete, and the money is assumed to be expended equally year by year during the period of construction.

Para. 3—

Cost of Works	Rs.	89,27,141	0	0
Balance cost of Plant for Dredging		4,06,459	0	0
Plus deficit error in volumes of excavations for Moody Bay Dock ..... =		6,93,279	4	1
	Rs.	1,00,26,879	4	1
Contingencies, 10 per cent. ..... =		10,02,687	14	10
	Rs.	1,10,29,567	2	11
Establishment, 7 per cent..... =		7,72,069	11	2
	Rs.	1,18,01,636	14	1
Ten years' Interest at 4 per cent..... =		29,34,301	10	3
Total...	Rs.	1,47,35,938	8	4

Then—

	Rs.	1,47,35,938	8	4
Minus Mr. Ormiston's Estimate...		1,28,67,285	0	0
Difference error deficit ..... =	Rs.	18,68,653	8	4

Mr. Ormiston's Estimate of Moody Bay Dock.

"Para. 9—

"If it be assumed that the Stilling "Basin be kept in abeyance, and that 7 "lakhs be deducted in the meantime from "the Harbour frontage wall, and that "the work be done in six years, the esti- "mate will stand as follows, *viz.*—

"Moody Dock	Rs.	66,00,964
"D. D. Frontage, say		7,00,000
		59,00,964
"Add walls at south end "Reclamation, 200 lineal "feet at Rs. 400 per feet	=	80,000
"Temporary wall next land, "say	=	10,527
		59,91,491
"Channel		35,650
"Channel through site of Stil- "ling Basin, take half "cost of dredging the "above, 94,414 ÷ 2 ...	=	47,207
		60,74,348
"Land Estate, Rs. 15,86,989 "D. D. for slew- "ing in Dock at "north end... 5,53,401	=	10,33,588
"Sidings	=	1,31,700
"Dredging Plant, balance of cost.....	=	4,06,459
		76,46,095
"Contingencies, 10 per cent.	=	7,64,609
		84,10,704
"Establishment, 7 per cent.	=	5,88,749
		89,99,453
"Interest at 4 per cent. over six years	=	11,48,380
	Rs.	1,01,47,833

"Pier Break-water, *or other arrangement*, to shelter the entrance."

Compare Mr. Ormiston's Estimate of cost of Moody Bay Dock Works, computed from his own figures corrected, which were published in the *Times of India* by the Bombay Port Trust on the 17th August 1874, and the work to be done in six years.

Para. 9—

Works as per Statement.....		Rs.	76,46,095	0 0
Contingencies, 10 per cent.	=		7,64,609	8 0
		Rs.	84,10,704	8 0
Establishment, 7 per cent.	=		5,88,749	5 0
		Rs.	89,99,453	13 0
Six years' Interest at 4 per cent.....	=		13,47,359	15 1
		Total Rs.	1,03,46,813	12 1

Then—

		Rs.	1,03,46,813 12 1
Minus Mr. Ormiston's Estimate	=		1,01,47,833 0 0
Difference error deficit	=	Rs.	1,98,980 12 1

Compare the cost of Moody Bay Dock with corrected figures and the volumes of excavations in mud, clay, and rock computed from Mr. Ormiston's reduced levels, exhibited and set forth at page 8 of his estimate, dated the 10th June, as per plan No. 1172, and specially referred to in para. 9 in his farewell statement, published by the Bombay Port Trust in the *Times of India*, dated 17th August 1874, without the Harbour frontage wall and Stilling Basin, with the Dock slewed in at the north end, as per plan No. 1173, and the work to be done in six years.

Masonry.

Harbour frontage wall 3,000 lineal feet = Rs. 12,00,000—Rs. 7,00,000				= Rs. 5,00,000	0	0
Wharf-wall around Dock 6,400 do. at Rs. 302 per lineal foot				= 19,50,920	0	0
Wharf-wall at south end 200 do. at Rs. 400 ,,				= 80,000	0	0
Temporary wall next land, say				= 10,527	0	0
				Rs. 25,41,447	0	0

Excavations.

Water area of Dock and walls 21,673-3947 brass of mud and clay at Rs. 2-4-0 per brass	= Rs.	48,765	2 2			
Ditto ditto Rock 110,437-68 brass at Rs. 9 per brass	=	9,93,939	1 11			
				= 10,42,704	4	1
				Rs. 35,84,151	4	1

Dredging.

Dredging Entrance Channel	=	35,650	0 0			
Ditto through Stilling Basin	=	47,207	0 0			
				= 82,857	0	0

Land Estate.

Filling with Dock slewed in at north end	= Rs.	10,33,588	0 0			
461,310 brass Dock Wharves at Rs. 3 per brass	=	13,34,850	0 0			
				= 23,68,438	0	0
Entrances complete, p. 55	= Rs.	7,53,695	0 0			
Wings ditto p. 54	=	1,11,804	0 0			
				= 8,65,499	0	0
17,920 squares metalling at Rs. 8 per square	= Rs.	1,50,080	0 0			
Sidings	=	1,31,700	0 0			
				= 2,81,780	0	0
Capstans, Cranes and Seats, Bollards, Mooring Buoys, Water Sheds, extra for 4 stairs, Swing Bridge, and Plant		.....		= 11,08,369	0	0
				Rs. 82,91,094	4	1
Contingencies, 10 per cent.		.....		= 8,29,109	6	9
				Rs. 91,20,203	10	10
Establishment, 7 per cent.		.....		= 6,38,414	4	1
				Rs. 97,58,617	14	11
Six years' interest at 4 per cent.		.....		= 14,61,018	12	4
				Total Rs. 1,12,19,636	11	3

Then—

	Rs. 1,12,19,636	11	3
Minus Mr. Ormiston's Estimate	1,01,47,833	0	0
Difference error deficit ... = Rs.	10,71,803	11	3

N.B.—Additional demonstrations will follow.

Bombay, September 28th, 1874.

S. A. JOHNSON.

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